We claim:

1. An apparatus for holding and dispensing a plurality of cups, each of said cups having a conical lower portion and a cylindrical upper portion having a top flange, a bottom flange, and a groove formed therebetween, comprising:

a supply tube having a lower end and an interior suitable for holding said cups in a stack, said stack having at least a bottom-most cup and a next-bottom-most cup located above said bottom-most cup; and

an escapement located adjacent the lower end of said supply tube, said escapement including a disk having a top side, a bottom side and an aperture formed therein, a first leaf attached to the top side of said disk and a second leaf attached to the bottom side of said disk;

wherein said escapement is moveable between a first position in which said second leaf engages the bottom flange of said bottom-most cup and a second position in which said first leaf is inserted into the groove of said next-bottom-most cup and engages the top flange of said next-bottom-most cup and in which said second leaf no longer engages the bottom flange of said bottom-most cup such that said bottom-most cup falls through said aperture formed in said disk.

2. An apparatus according to claim 1, further comprising a support, wherein said supply tube is fixedly attached to said support and wherein said escapement is moveably attached to said support by a spring.

3. An apparatus according to claim 1, further comprising means for moving said escapement between said first position and said second position.

4. An apparatus according to claim 1, further comprising a sample shuttle having a plurality of sample holding positions and at least one actuation pin, wherein said escapement is moveable in a first direction between said first position and said second position, wherein said sample shuttle is moveable in said first direction and said at least one actuation pin engages said escapement and moves said escapement from said first position to said second position.

5. An apparatus according to claim 4, wherein one of said sample holding positions is located directly beneath said supply tube when said escapement is moved to said second position.

6. An apparatus according to claim 5, wherein said sample holding position located directly beneath said supply tube is provided with a cylindrical insert, and wherein when a cup falls through said aperture formed in said disk, said conical lower portion of said cup is guided by said cylindrical insert.

7. An apparatus according to claim 6, wherein said cylindrical insert has an inside diameter slightly larger than a largest diameter of said conical lower portion measured at a position adjacent said cylindrical upper portion.

8. An apparatus according to claim 1, further comprising means for ensuring that said cups are inserted into said supply tube conical lower portion first.

9. An apparatus according to claim 1, wherein said supply tube further comprises a spring having an angular portion and a cup stop which protrude into said interior of said supply tube, wherein said angular portion and said cup stop are pushed out of said interior to allow said cups to slide past said spring when said cups are inserted into said supply tube conical lower

portion first, and wherein said angular portion and said cup stop remain in said interior to prevent said cups from sliding past said spring when said cups are inserted into said supply tube cylindrical upper portion first.

10. An apparatus according to claim 1, wherein said second leaf has a thickness and wherein said thickness is chosen such that said second leaf will not fit into said groove.

11. An apparatus according to claim 1, further comprising an incubator having a temperature controller, a temperature sensor, a heater, and an insulated heat sink, said incubator having N cup holding positions and up to N-1 insulating covers which fit over said cup holding positions.

12. An apparatus according to claim 11, wherein said cup holding positions include a conical lower portion adapted to receive said conical lower portion of said cups, and a cylindrical upper portion having a diameter larger than a diameter of said cylindrical upper portion of said cups.

13. An apparatus according to claim 12, wherein when said cups are inserted into said cup holding positions, said conical lower portions of said cups are in thermal contact with said conical lower portions of said cup holding positions.

14. An apparatus according to claim 1, wherein said supply tube has a C-shaped cross section.

15. An apparatus according to claim 1, wherein said supply tube further comprises at least two supply tubes mounted on a rotable turret.

16. An apparatus according to claim 15, wherein each of said supply tubes has a lower end and wherein said turret can be rotated to selectively position a selected one of said lower ends of said supply tubes over said escapement.

17. An apparatus according to claim 1, wherein said bottom flange of said cups has a bottom surface, and wherein said top flange of said cups has a top surface, and wherein a distance between said bottom surface and said top surface is chosen such that a plurality of said cups can nest within one another in a ratio between 1.5 to 1 and 6 to 1.

18. An apparatus according to claim 1, wherein said bottom flange of said cups has a bottom surface and wherein said top flange of said cups has a top surface, and wherein a distance between said bottom surface and said top surface is between 2 mm and 20 mm such that said cup cannot tumble when placed inside said supply tube.

19. A cup handling subsystem for an automated clinical chemistry analyzer system, comprising:

a plurality of cups, each of said cups having a conical lower portion and a cylindrical upper portion having a top flange, a bottom flange, and a groove formed therebetween;

a supply tube having a lower end and an interior suitable for holding said cups in a stack, said stack having at least a bottom-most cup and a next-bottom-most cup located above said bottom-most cup;

an escapement located adjacent the lower end of said supply tube, said escapement including a disk having a top side, a bottom side and an aperture formed therein, a first leaf

attached to the top side of said disk and a second leaf attached to the bottom side of said disk, wherein said escapement is moveable between a first position in which said second leaf engages the bottom flange of said bottom-most cup and a second position in which said first leaf is inserted into the groove of said next-bottom-most cup and engages the top flange of said next-bottom-most cup and in which said second leaf no longer engages the bottom flange of said bottom-most cup such that said bottom-most cup falls through said aperture formed in said disk; and

an incubator.

20. A cup handling subsystem according to claim 19, wherein said incubator comprises a temperature controller, a temperature sensor, a heater, and an insulated heat sink.

21. A cup handling subsystem according to claim 20, wherein said incubator has N cup holding positions and up to N-1 insulating covers which fit over said cup holding positions.

22. A cup handling subsystem according to claim 21, wherein said cup holding positions include a conical lower portion adapted to receive said conical lower portion of said cups, and a cylindrical upper portion having a diameter larger than a diameter of said cylindrical upper portion of said cups.

23. A cup handling subsystem according to claim 22, wherein when said cups are inserted into said cup holding positions, said conical lower portions of said cups are in thermal contact with said conical lower portions of said cup holding positions.

24. A cup handling subsystem according to claim 19, further comprising a support, wherein said supply tube is fixedly attached to said support and wherein said disk is moveably attached to said support by a spring.

25. A cup handling subsystem according to claim 19, further comprising means for moving said disk between said first position and said second position.

26. A cup handling subsystem according to claim 19, further comprising a sample shuttle having a plurality of sample holding positions and at least one actuation pin, wherein said escapement is moveable in a first direction between said first position and said second position, wherein said sample shuttle is moveable in said first direction and said at least one actuation pin engages said escapement and moves said disk from said first position to said second position.

27. A cup handling subsystem according to claim 26, wherein one of said sample holding positions is located directly beneath said supply tube when said escapement is moved to said second position.

28. A cup handling subsystem according to claim 27, wherein said sample holding position located directly beneath said supply tube is provided with a cylindrical insert, and wherein when a cup falls through said aperture formed in said disk, said conical lower portion of said cup is guided by said cylindrical insert.

29. A cup handling subsystem according to claim 28, wherein said cylindrical insert has an inside diameter slightly larger than a largest diameter of said conical lower portion measured at a position adjacent said cylindrical upper portion.

30. A cup handling subsystem according to claim 19, wherein said supply tube further comprises a spring having an angular portion and a cup stop which protrude into said interior of said supply tube, wherein said angular portion and said cup stop are pushed out of said interior to allow said cups to slide past said spring when said cups are inserted into said supply tube conical lower portion first, and wherein said angular portion and said cup stop remain in said interior to prevent said cups from sliding past said spring when said cups are inserted into said supply tube cylindrical upper portion first.

31. A cup handling subsystem according to claim 19, wherein said second leaf has a thickness and wherein said thickness is chosen such that said second leaf will not fit into said groove.

32. A cup handling subsystem according to claim 19, wherein said supply tube further comprises at least two supply tubes mounted on a rotable turret.

33. A cup handling subsystem according to claim 32, wherein each of said supply tubes has a lower end and wherein said turret can be rotated to selectively position a selected one of said lower ends of said supply tubes over said escapement.

34. A cup handling subsystem according to claim 19, wherein said bottom flange of said cups has a bottom surface, and wherein said top flange of said cups has a top surface, and wherein a distance between said bottom surface and said top surface is chosen such that a plurality of said cups can nest within one another in a ration between 1.5 to 1 and 6 to 1.

35. A cup handling subsystem according to claim 19, wherein said bottom flange of said cups has a bottom surface and wherein said top flange of said cups has a top surface, and

wherein a distance between said bottom surface and said top surface is between 2 mm and 20 mm such that said cup cannot tumble when placed inside said supply tube.

36. A sample cup, comprising:

a conical lower portion; and

a cylindrical upper portion having a top flange, a bottom flange and a groove formed therebetween.

37. A sample cup according to claim 36, wherein said bottom flange has a bottom surface and wherein said top flange has a top surface, and wherein a distance between said bottom surface and said top surface is chosen such that a plurality of said sample cups will nest within one another in a ratio between 1.5 to 1 and 6 to 1.

38. A sample cup according to claim 37, wherein said ratio is 3 to 1.

39. A sample cup according to claim 37, wherein said distance between said bottom surface and said top surface is between 2 mm and 20 mm.

40. A sample cup according to claim 36, wherein said bottom flange has a bottom surface and wherein said top flange has a top surface, and wherein a distance between said bottom surface and said top surface is chosen such that said cup cannot tumble when placed inside a tube.

41. An apparatus for holding and dispensing a plurality of cups, each of said cups having a conical lower portion and a cylindrical upper portion having a flange, comprising:

a supply tube having a lower end and an interior suitable for holding said cups in a stack, said stack having at least a bottom-most cup and a next-bottom-most cup located above said bottom-most cup; and

an escapement located adjacent the lower end of said supply tube, said escapement including a disk having a top side, a bottom side and an aperture formed therein, a first leaf attached to the top side of said disk and a second leaf attached to the bottom side of said disk;

wherein said escapement is moveable between a first position in which said second leaf engages the flange of said bottom-most cup and a second position in which said first leaf engages the flange of said next-bottom-most cup and in which said second leaf no longer engages the flange of said bottom-most cup such that said bottom-most cup falls through said aperture formed in said disk.

42. An apparatus according to claim 41, further comprising a support, wherein said supply tube is fixedly attached to said support and wherein said escapement is moveably attached to said support by a spring.

43. An apparatus according to claim 41, further comprising means for moving said escapement between said first position and said second position.

44. An apparatus according to claim 41, further comprising a sample shuttle having a plurality of sample holding positions and at least one actuation pin, wherein said escapement is moveable in a first direction between said first position and said second position, wherein said sample shuttle is moveable in said first direction and said at least one escapement pin engages said escapement and moves said escapement from said first position to said second position.

45. An apparatus according to claim 44, wherein one of said sample holding positions is located directly beneath said supply tube when said escapement is moved to said second position.

46. An apparatus according to claim 45, wherein said sample holding position located directly beneath said supply tube is provided with a cylindrical insert, and wherein when a cup falls through said aperture formed in said disk, said conical lower portion of said cup is guided by said cylindrical insert.

47. An apparatus according to claim 46, wherein said cylindrical insert has an inside diameter slightly larger than a largest diameter of said conical lower portion measured at a position adjacent said cylindrical upper portion.

48. An apparatus according to claim 41, further comprising means for ensuring that said cups are inserted into said supply tube conical lower portion first.

49. An apparatus according to claim 41, wherein said supply tube further comprises a spring having an angular portion and a cup stop which protrude into said interior of said supply tube, wherein said angular portion and said cup stop are pushed out of said interior to allow said cups to slide past said spring when said cups are inserted into said supply tube conical lower portion first, and wherein said angular portion and said cup stop remain in said interior to prevent said cups from sliding past said spring when said cups are inserted into said supply tube cylindrical upper portion first.

50. An apparatus according to claim 41, further comprising an incubator having a temperature controller, a temperature sensor, a heater, and an insulated heat sink, said incubator

having N cup holding positions and up to N-1 insulating covers which fit over said cup holding positions.

51. An apparatus according to claim 51, wherein said cup holding positions include a conical lower portion adapted to receive said conical lower portion of said cups, and a cylindrical upper portion having a diameter larger than a diameter of said cylindrical upper portion of said cups.

52. An apparatus according to claim 52, wherein when said cups are inserted into said cup holding positions, said conical lower portions of said cups are in thermal contact with said conical lower portions of said cup holding positions.

53. An apparatus according to claim 41, wherein said supply tube has a C-shaped cross-section.

54. An apparatus according to claim 41, wherein said supply tube further comprises at least two supply tubes mounted on a rotable turret.

55. An apparatus according to claim 54, wherein each of said supply tubes has a lower end and wherein said turret can be rotated to selectively position a selected one of said lower ends of said supply tubes over said escapement.

56. An apparatus according to claim 1, further comprising means for detecting when the number of cups within said supply tube has fallen below a predetermined level.

57. A cup handling subsystem according to claim 19, further comprising means for detecting when the number of cups within said supply tube has fallen below a predetermined level.

58. An apparatus according to claim 41, further comprising means for detecting when the number of cups within said supply tube has fallen below a predetermined level.

59. An apparatus for holding and dispensing a plurality of cups, each of said cups having a conical lower portion and a cylindrical upper portion having a top flange, a bottom flange, and a groove formed therebetween, comprising:

a plurality of supply tubes mounted on a rotatable turret, each supply tube having a lower end and an interior suitable for holding said cups in a stack, said stack having at least a bottom-most cup and a next-bottom-most cup located above said bottom-most cup; and

an escapement located adjacent the lower end of a selected one of said supply tubes, said escapement including a disk having a top side, a bottom side and an aperture formed therein, a first leaf attached to the top side of said disk and a second leaf attached to the bottom side of said disk;

wherein said escapement is moveable between a first position in which said second leaf engages the bottom flange of said bottom-most cup and a second position in which said first leaf is inserted into the groove of said next-bottom-most cup and engages the top flange of said next-bottom-most cup and in which said second leaf no longer engages the bottom flange of said bottom-most cup such that said bottom-most cup falls through said aperture formed in said disk.

60. An apparatus for holding and dispensing a plurality of cups, each of said cups having a conical lower portion and a cylindrical upper portion having a flange, comprising:

a plurality of supply tubes mounted on a rotatable turret, each supply tube having a lower end and an interior suitable for holding said cups in a stack, said stack having at least a bottom-most cup and a next-bottom-most cup located above said bottom-most cup; and

an escapement located adjacent the lower end of a selected one of said supply tubes, said escapement including a disk having a top side, a bottom side and an aperture formed therein, a first leaf attached to the top side of said disk and a second leaf attached to the bottom side of said disk;

wherein said escapement is moveable between a first position in which said second leaf engages the flange of said bottom-most cup and a second position in which said first leaf engages the flange of said next-bottom-most cup and in which said second leaf no longer engages the flange of said bottom-most cup such that said bottom-most cup falls through said aperture formed in said disk.